WHAT IS CLAIMED IS:

[Claim 1]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer on said support substrate via said porous semiconductor layer,

a process of forming an insulating layer on a surface of said mono crystalline semiconductor layer and subsequently removing the insulating layer in the peripheral circuit region while leaving the insulating layer in the display region in order to form a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial growth ,growth,

a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,

a process of separating said support substrate from said porous semiconductor layer,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 2]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer both on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer both on said seed substrate and support substrate, respectively via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,

a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,

a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least with a hydrogen annealing treatment,

a process of forming an insulating layer on the etched surface of the mono crystalline semiconductor layer and [subsequently] removing the insulating layer in the peripheral circuit region while leaving the insulating layer

in the display region in order to form a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,
a process of separating said support substrate from said porous semiconductor layer on the same support substrate,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.
[Claim 3]
A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an insulating layer on the surface of a support substrate made of a mono crystalline semiconductor and subsequently removing the insulating layer in the peripheral circuit region while leaving the insulating layer in the display region in order to form a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit

region, respectively by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,
a process of forming an ion injection layer at a specified depth in said support substrate,
a process of performing a separation type annealing treatment,
a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.
[Claim 4]
A method of manufacturing an ultra-slim electrooptic display comprising:
inga process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on the insulating layer of said support substrate, and

subsequently by forming a covalent bonding between said ion injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of forming an insulating layer on the etched surface of the mono crystalline semiconductor layer and subsequently removing the insulating layer in the peripheral circuit region while leaving the insulating layer in the display region in order to form a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,

a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,

a process of forming an ion injection layer at a specified depth in said support substrate,

a process of performing a separation type annealing treatment,

a process of separating said support substrate at the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 5]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer using a heat treatment,
a process of separating said seed substrate at the strained strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,
a process of forming an insulating layer on the etched surface of the mono crystalline semiconductor layer and subsequently removing the insulating layer in the peripheral circuit region while leaving the insulating layer in the display region in order to form a polycrystalline semiconductor layer of said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,
a process of separating said support substrate from said porous semiconductor layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.
[Claim 6]
A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on a surface of said mono crystalline semiconductor layer, and further forming an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer,
a process of removing at least the amorphous semiconductor layer, the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the peripheral circuit region while leaving the insulating layer and the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the display region,
a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, respectively,
a process of separating said support substrate from said porous semiconductor layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 7]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer on said seed substrate and support substrate via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,

a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,

a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least using a hydrogen annealing treatment,

a process of forming an insulating layer on a surface of said mono crystalline semiconductor layer, and further forming an amorphous semiconductor layer or an amorphous and

polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer,

a process of removing at least the amorphous semiconductor layer, the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the peripheral circuit region while leaving the insulating layer and the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the display region,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,

a process of separating said support substrate from said porous semiconductor layer on the same support substrate,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 8]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming an insulating layer on a surface of a support substrate made of a mono crystalline semiconductor,

and further forming an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer,

a process of removing at least the amorphous semiconductor layer, the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the peripheral circuit region while leaving the insulating layer and the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the display region,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,

a process of forming an ion injection layer at a specified depth in said support substrate,

a process of performing a separation type annealing treatment,

a process of separating said support substrate from the strained section of said ion injection layer,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 9]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,

a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of forming an insulating layer on a surface of said mono crystalline semiconductor layer, and further forming an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer,

a process of removing at least the amorphous semiconductor layer, the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the

peripheral circuit region while leaving the insulating layer and the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the display region,
a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,
a process of forming an ion injection layer at a specified depth in said support substrate,
a process of performing a separation type annealing treatment,
a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 10]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer using a heat treatment,
a process of separating said seed substrate at the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,
a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,
a process of forming an insulating layer on a surface of said mono crystalline semiconductor layer, and further forming an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer,
a process of removing at least the amorphous semiconductor layer, the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the peripheral circuit region while leaving the insulating layer and the amorphous semiconductor layer or the amorphous and

polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in the display region, a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer, or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,

a process of separating said support substrate from said porous semiconductor layer,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 11]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer both on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer both on said seed substrate and support substrate, respectively via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,
a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,
a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least with a hydrogen annealing treatment,
a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,
a process of forming a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,
a process of separating said support substrate from said porous semiconductor layer on the same support substrate,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.
[Claim 12]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,

a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region by semiconductor epitaxial crystallization,

a process of forming a display device unit in the polycrystalline semiconductor layer of said display region

and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,
a process of forming an ion injection layer at a specified depth in said support substrate,
a process of performing a separation type annealing treatment,
a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 13]

A method of manufacturing an ultra-slim electrooptic display comprisinging:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion

injection layer and the insulating layer using a heat treatment,

a process of separating said seed substrate at the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region by semiconductor epitaxial crystallization,

a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,

a process of separating said support substrate from said porous semiconductor layer on the same support substrate,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 14]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer both on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer both on said seed substrate and support substrate, respectively via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,

a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,

a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,
a process of separating said support substrate from said porous semiconductor layer on the same support substrate,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 15]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on the insulating layer of said support substrate, and
subsequently by forming a covalent bonding between said ion

injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,

a process of forming an ion injection layer at a specified depth in said support substrate,

a process of performing a separation type annealing treatment,

a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 16]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer using a heat treatment,
a process of separating said seed substrate at the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,
a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,
a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,
a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,
a process of separating said support substrate from said porous semiconductor layer on the same support substrate,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.
[Claim 17]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer both on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer both on said seed substrate and support substrate, respectively via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,

a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,

a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a light-shielding metallic layer in the polycrystalline semiconductor display device forming region of the display region,

a process of coating the surface with an insulating layer,

a process of forming a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,
a process of separating said support substrate from said porous semiconductor layer on the same support substrate,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 18]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on the insulating layer of said support substrate, and
subsequently by forming a covalent bonding between said ion

injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a light-shielding metallic layer in the polycrystalline semiconductor display device forming region of the display region,

a process of coating the surface with an insulating layer,

a process of forming a polycrystalline semiconductor layer in said display

region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,

a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,

a process of forming an ion injection layer at a specified depth in said support substrate,

a process of performing a separation type annealing treatment,

a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 19]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer using a heat treatment,
a process of separating said seed substrate at the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,
a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,
a process of forming a light-shielding metallic layer in the polycrystalline semiconductor display device forming region of the display region,
a process of coating the surface with an insulating layer,
a process of forming a polycrystalline semiconductor layer in said display region and a mono crystalline semiconductor layer in said peripheral circuit region, respectively by semiconductor epitaxial crystallization,
a process of forming a display device unit in the polycrystalline semiconductor layer of said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region,
a process of separating said support substrate from said porous semiconductor layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 20]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming a porous semiconductor layer both on a seed substrate and support substrate, each made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer both on said seed substrate and support substrate, respectively via said porous semiconductor layer,

a process of forming an insulating layer via said mono crystalline semiconductor layer on at least one of said seed substrate or support substrate,

a process of bonding said seed substrate and support substrate at the surface forming said insulating layer,

a process of separating said seed substrate from the porous semiconductor layer of the same seed substrate,

a process of flattening the surface of said mono crystalline semiconductor layer which has been exposed by separating said seed substrate, by etching at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a light-shielding metallic layer in the amorphous semiconductor layer or amorphous and polycrystalline mixed semiconductor layer or polycrystalline semiconductor display device forming region of the display region,

a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed

semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,

a process of separating said support substrate from said porous semiconductor layer on the same support substrate,

a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and

a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 21]

A method of manufacturing an ultra-slim electrooptic display comprising:

a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,

a process of forming an insulating layer on a support substrate made of a mono crystalline semiconductor,

a process of forming a mono crystalline semiconductor layer by bonding an ion injection layer of said seed substrate on

the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer with a heat treatment,

a process of separating said seed substrate from the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least with a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a light-shielding metallic layer in the amorphous semiconductor layer or amorphous and polycrystalline mixed semiconductor layer or polycrystalline semiconductor display device forming region of the display region,

a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of

said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,
a process of forming an ion injection layer at a specified depth in said support substrate,
a process of performing a separation type annealing treatment,
a process of separating said support substrate from the strained section of said ion injection layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 22]

A method of manufacturing an ultra-slim electrooptic display comprising:
a process of forming an ion injection layer on a seed substrate made of a mono crystalline semiconductor,
a process of forming a porous semiconductor layer on a support substrate made of a mono crystalline semiconductor,
a process of forming a mono crystalline semiconductor layer via said porous semiconductor layer on said support substrate,
a process of forming an insulating layer on said mono crystalline semiconductor layer,
a process of forming a mono crystalline semiconductor layer by bonding the ion injection layer of said seed substrate

with the insulating layer of said support substrate, and subsequently by forming a covalent bonding between said ion injection layer and the insulating layer using a heat treatment,

a process of separating said seed substrate at the strained section of the ion injection layer of the same seed substrate by performing a separation type annealing treatment,

a process of flattening by etching the surface of said mono crystalline semiconductor layer at least using a hydrogen annealing treatment,

a process of exposing the insulating layer by etching the display region of said mono crystalline semiconductor layer,

a process of forming a light-shielding metallic layer in the amorphous semiconductor layer or amorphous and polycrystalline mixed semiconductor layer or polycrystalline semiconductor display device forming region of the display region,

a process of forming an insulating layer and an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer, or a polycrystalline semiconductor layer on the entire surface,

a process of forming a display device unit in the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer in said display region, and a peripheral circuit unit in the mono crystalline semiconductor layer of

said peripheral circuit region, wherein at least the amorphous semiconductor layer or the amorphous and polycrystalline mixed semiconductor layer or the polycrystalline semiconductor layer have been etched,
a process of separating said support substrate from said porous semiconductor layer,
a process of bonding a support on the ultra-slim electrooptic display device substrate after said separation, and
a process of being divided into various ultra-slim electrooptic displays after bonding said support.

[Claim 23]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 5, claims 11 to 13, and claims 17 to 19, including
a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by solid phase crystallization after forming an amorphous semiconductor layer selectively by ion injecting or ion doping using at least one kind of Group IV elements for the polycrystalline semiconductor layer in said display region, and
a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 24]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 6 to 10, claims 14 to 16, and claims 20 to 22, including

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by solid phase crystallization after selective ion injection or ion doping using at least one kind of Group IV elements for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 25]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 5, claims 11 to 13, and claims 17 to 19, including

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by recrystallization of the polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral

circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 26]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 6 to 10, claims 14 to 16, and claims 20 to 22, including

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size after recrystallization of an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 27]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 5, claims 11 to 13, and claims 17 to 19, including

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by recrystallization of said display region after selective ion injection or ion doping using at least one kind of Group IV elements for the

polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 28]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 6 to 10, claims 14 to 16, and claims 20 to 22, including

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by recrystallization after selective ion injection or ion doping using at least one kind of Group IV elements for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 29]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 5, claims 11 to 13, and claims 17 to 19, including

a process of forming a polycrystalline semiconductor layer containing at least one kind of Group IV elements in said display region and a mono crystalline semiconductor layer in said peripheral circuit region by said semiconductor epitaxial crystallization,

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by solid phase crystallization of the polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 30]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 5, claims 11 to 13, and claims 17 to 19, including

a process of forming a polycrystalline semiconductor layer containing at least one kind of Group IV elements in said display region and a mono crystalline semiconductor layer in said peripheral circuit region by said semiconductor epitaxial growth,

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by recrystallization of the polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 31]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 6 to 10, claims 14 to 16, and claims 20 to 22, including

a process of forming for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer containing at least one kind of Group IV elements in said display region and a mono crystalline semiconductor layer in said peripheral circuit region,

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by solid phase crystallization selectively for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 32]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 6 to 10, claims 14 to 16, and claims 20 to 22, including

a process of forming for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer containing at least one kind of Group IV elements in said display region and a mono crystalline semiconductor layer in said peripheral circuit region,

a process of forming a polycrystalline semiconductor layer with controlled crystal grain size by recrystallization for an amorphous semiconductor layer or an amorphous and polycrystalline mixed semiconductor layer or a polycrystalline semiconductor layer in said display region, and

a process of forming a display device unit in the polycrystalline semiconductor layer having the controlled crystal grain size in said display region and a peripheral circuit unit in the mono crystalline semiconductor layer of said peripheral circuit region.

[Claim 33]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claim 1, claim 2, claim 5, claim 6, claim 7, claim 10, claims 11, claim 13, claim 14, claim 16, claim 17, claim 19, claim 20, claim 22, claim 23, claim 24, claim 25, claim 26, claim 27, claim 28, claim 29, claim 30, claim 31, or claim 32, wherein said support substrate is separated after forming a groove from said mono crystalline semiconductor layer at least up to said porous semiconductor layer along the division line in the division region when being divided into said various ultra-slim electrooptic displays.

[Claim 34]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claim 3, claim 4, claim 8, claim 9, claim 12, claim 15, claim 18, claim 21, claim 23, claim 24, claim 25, claim 26, claim 27, claim 28, claim 29, claim 30, claim 31, or claim 32, wherein said support substrate is separated after forming a groove from said mono crystalline semiconductor layer at least up to said strained section of the ion injection layer of said support substrate along the division line in the division region when being divided into said various ultra-slim electrooptic displays.

[Claim 35]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 34, wherein a

cathode, an organic electroluminescence (EL) emitting layer and an anode, connected to pixel display devices of the support substrate forming said display device unit and the peripheral circuit unit are formed,
after being sealed with a moisture resistant resin, said support substrate is separated,
a transparent support is bonded using a transparent sealant on the ultra-slim electrooptic display device substrate after said separation, and
said various ultra-slim electrooptic displays are produced by dividing.

[Claim 36]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 34, wherein
a white reflective film is formed in the sections other than the pixel opening section in the display region of the ultra-slim electrooptic display device substrate and at the liquid crystal side of the facing substrate corresponding to the entire areas of the peripheral circuits, and a black low reflective light shielding film is formed in the sections other than the pixel opening section in the display region of the ultra-slim electrooptic display device substrate and on the transparent support substrate surface corresponding to the entire areas of the peripheral circuits.

[Claim 37]

The method of manufacturing an ultra-slim electrooptic display as claimed in any of claims 1 to 34, wherein a facing substrate forming microlens arrays to function as a collective lens after performing an alignment processing by forming transparent electrodes and an alignment film and the pixel opening section in the display region are etched and are mounted with a transmissive material for surface flattening,

an electrooptic display device substrate after performing an alignment processing by forming transparent electrodes, connected to the display devices, and an alignment film, is laminated and sealed, subsequently a liquid crystal is injected for sealing,

the support substrate is separated from the porous semiconductor layer or the strained section of the ion injection layer, the ultra-slim electrooptic display device substrate after removing the separation residue by etching, is bonded using a sealant with a transparent support substrate forming microlens arrays to function as a field lens.